

REMARKS

Claims 1-7 are pending in the above-referenced application and stand rejected pursuant to one or more of 35 U.S.C §102, 35 U.S.C. §103 and 35 U.S.C. §112. Also, the instant office action includes objections to the specification and the drawings of the application, as filed.

Both the drawings and specification have been amended herein to overcome the objections thereto. Regarding claims 1-7, their rejections are overcome or demonstrated to be inappropriate in view of at least the amendments set forth above and/or the remarks that follow.

Objection to the Drawings

The Examiner objects to the drawings pursuant to 37 C.F.R. §1.83(p)(5) because the drawings allegedly do not depict certain reference numerals that are discussed in the specification of the application. Specifically, the Examiner indicates that neither reference numeral 32 (as included on page 22, line 6 of the specification of the application, as filed), nor reference numeral 17 (as included on page 30, line 8 of the specification of the application, as filed), nor reference numeral 18 (as included on page 30, line 11 of the specification of the application, as filed) are depicted in the drawings of the application, as filed.

Enclosed with this communication is a photoprint of drawing page that includes FIG. 5 of this application and that has been marked in red to depict reference numerals 17 and 18 with respect to FIG. 5. Also enclosed herein is a "clean copy" of the drawing page that includes FIG. 5 and that has been amended to also depict reference numerals 17 and 18 with respect to FIG. 5.

The chosen placements of reference numerals 17 and 18 with respect to FIG. 5 are supported by the specification of this application as filed (see, e.g., the text located between page 29, line 25 and page 30, line 12) and in view of the placement of the target 10, the backing plate 30 and the surface 17 in FIG. 5, as filed. In particular, the chosen placements of reference numerals 17 and 18 are appropriate because reference numeral 17 denotes a surface that abuts the target 10 of the backing plate 30, and because reference numeral 18 denotes a surface opposite the surface 17.

Regarding reference numeral 32, the drawings have not been amended to include reference numeral 32. This is because the text at page 22, line 6 recited "substrate 32" as a result of an inadvertent typographical error. The text should have instead read – and has been amended herein to read - "substrate 42." This amendment is supported by the application as a whole, and by the fact that reference numeral 32 did not appear anywhere else within the specification of this application, as filed, whereas "substrate 42" appeared at page 21, line 2 of the specification of this application, as filed.

Applicants respectfully request the Examiner's approval of the enclosed drawing amendments. In view of the amendment to the specification regarding reference numeral 32 and in further view of the amendments to the drawings regarding reference numerals 17 and 18, the objections to the drawings of the application have either been overcome or have been rendered moot and, therefore, should be withdrawn.

Objections to the Specification

The Examiner objects to the specification because it includes various informalities, namely typographical errors. As noted above, the specification has been amended to correct these errors; consequently, the objections to the specification have been overcome and should be withdrawn.

The §112 Rejections

Claim 6 is rejected pursuant to 35 U.S.C. §112, second paragraph as being indefinite for failing to point out and distinctly claim the subject matter that Applicants regard as the invention. Specifically, claim 6 is rejected because there is insufficient antecedent basis for the limitation "the cooling medium flow passage."

As indicated above, claim 1 has been amended to overcome this objection and to slightly modify the verbiage of the claim. Thus, amended claim 6 complies with the requirements of 35 U.S.C. §112; consequently, the rejection of claim 6 pursuant to 35 U.S.C. §112 should be withdrawn.

Th Prior Art Rejections

Claims 1-6 are rejected pursuant to 35 U.S.C. §102(e) as being anticipated by U.S. Patent No. 6,199,259 to Demaray et al. ("the Demaray patent"). Also, claim 7 is rejected pursuant to 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 6,143,149 to Abe ("the Abe patent") in view of U.S. Patent No. 5,985,115 to Hartsough et al. ("the Hartsough patent").

These rejections are either overcome or demonstrated to be inappropriate in view of at least the amendments set forth above and/or the remarks that follow.

Claim 1 of the application has been amended to incorporate some of the features of claim 2, namely (a) that the cooling means of the claimed backing plate includes at least one cooling medium flow passage, and wherein at least one cooling medium passage includes at least one branch and (b) that there is control of the flow rate of the cooling medium that is fed into the backing plate via the cooling means. This control of the flow rate of the cooling medium – along with (1) the cooling medium being fed to predetermined portions of the backing plate, and (2) different sputtering powers being applied to predetermined portions of the target – allows for substantially uniform temperature distribution within the target, and that, in turn, causes formation of a thin film with a substantially uniform film thickness.

Regarding claim 2, it has been amended to recite that the predetermined portions of the backing plate include at least a periphery of the backing plate.

With respect to claim 7, it has been amended to recite that the step of cooling the target is accomplished "via a cooling means that includes at least one cooling medium flow passage for feeding a cooling medium to the backing plate at a predetermined flow rate," and to further recite that "at least one cooling medium flow passage includes at least one branch." Claim 7 also has been amended to recite that the claimed method is effective to ensure a substantially uniform temperature distribution, which, in turn, enables formation of a thin film that has a substantially uniform film thickness.

No new matter is added by these amendments, support for which is provided throughout the specification, including, *inter alia*, page 12, lines 7-25.

Applicants note, for the record, that the amendments to claims 1, 2 and 7 are being made solely to expedite allowance of this application. By amending these claims, Applicants do not acquiesce to their rejection(s), or to the reasons offered by the Examiner in support of their rejection(s). Also, by amending claims 1, 2 and 7, Applicants do not dedicate the subject matter of these claims - as originally filed - to the public. Moreover, Applicants respectfully reserve the right to seek patent protection for one or more claims that are similar or identical to claim 1, claim 2 and/or claim 7 - as originally filed - in one or more related applications.

In view of at least these amendments and/or the remarks presented herein, the rejection(s) of claims 1-7 are either overcome or demonstrated to be inappropriate.

As emphasized in the claims, the present invention relies upon a cooling means that includes at least one cooling medium flow passage, wherein at least one cooling medium flow passage includes at least one branch. This results in a substantially uniform temperature distribution at a target, thus beneficially enabling formation of a thin film that has substantially uniform film thickness.

As discussed in the specification of this invention, among the numerous other benefits that result from the claimed invention are that it enables increased sputtering power and increased film deposition speed. These benefits, in turn, allow for increased productivity through use of the backing plate of claims 1-6 and the sputtering method of claim 7. What's more, all of these benefits are realized while still also enabling formation of a thin film with substantially uniform film thickness.

Also, by designing the backing plate as recited in claims 1-6 and by implementing the sputtering method of claim 7, the backing plate is able to control the conductance of any or all of the at least one cooling medium flow passage in accordance with the power consumption distribution in the target surface.

Even assuming – for the sake of argument – that the Examiner's interpretation of the Demaray patent is correct, the backing plate depicted and described in the Demaray patent is not designed in a manner that would allow for such control of the conductance to be achieved. For at least this reason, claims 1-7 are believed to be patentable over the Demaray patent.

Regarding the Abe patent, it discloses partitioning target materials into a plurality of segments, and forming films under "different conditions" that result in "films of different thickness" (see, e.g., column 4, lines 20-23 of the Abe patent). This is accomplished through the use of shield plates, which are disposed between electrodes and a substrate, and which separate adjacent electrodes from each other in order to *prevent* a film from being formed under similar conditions in the separated plurality of segments.

Thus, not only does the Abe patent neither disclose nor suggest the backing plate of claim 1-6 and the sputtering method of claim 7, but it appears to *teach away* from the present invention in that it's goal/purpose is to form "films of different thickness," whereas the goal of the present invention is to form a thin film having "substantially uniform film thickness." And has long been held by the Court of Appeals for the Federal Circuit, teaching away from a claimed invention is the antithesis of suggesting that invention, and, therefore, the requisite suggestion, motivation, or incentive to produce the claimed invention cannot be provided by a reference that teaches away from the claimed invention. See, e.g., *In re Fine*, 5 USPQ2d 1596 (Fed. Cir. 1988).

As for the Hartsough patent, assuming - for the sake of argument - that it may be properly combined with the Abe patent, it is not believed to provide any additional disclosure or suggestion that would support the rejection of claims 1-7.

In view of at least the amendments and/or remarks above, the objections to the specification and drawings have been overcome, and claims 1-7 are believed to be patentable over the cited references and to meet the requirements of 35 U.S.C. §112.

Therefore, the present application is believed to be in condition for allowance, and reconsideration and allowance thereof are respectfully requested.

If the undersigned can be of any assistance in advancing the prosecution of this case, the Examiner is invited to contact him through the information given below.

Date: _____

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By: _____

Respectfully submitted



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Version of amendments with markings to indicate amended subject matter

Any additions to the amended subject matter are underlined, and any deletions are contained within brackets.

In the Specification

Please amend page 2, lines 8-16 of the specification as follows:

Fig. 6A is a plan view showing a conventional backing plate 104. Fig. 6B is a cross sectional view taken along the cross section line S5-S5 in Fig. 6A. The backing plate 104 is made of a metal such as [copper] copper or the like which is easily obtained and processed. Further, the backing plate 104 is formed so as to be mounted on the sputtering apparatus not shown in figure. The backing plate 104 provides the target 103 with a negative potential and also provided with a cooling means to prevent temperature increase.

Please also amend page 19, lines 9-12 of the specification as follows:

Figs. 7A and 7B are [views] views showing another conventional backing plate:
Fig. 7A is a plan view and Fig. 7B is a cross sectional view taken along a cross sectional line S6-S6 in Fig. 7A;

Please also amend page 22, lines 4-6 of the specification as follows:

Then, particles scattered from the surface of the target 10 is adhered and deposited on the surface of the substrate [32] 42 opposed to the target 10, thereby a thin film is formed.

Please also amend page 24, lines 13-19 of the specification as follows:

The backing plate 1 is usually made of a material having good thermal conductivity, such as copper or aluminum alloy. In order to match a coefficient of thermal expansion of the target 10 with that [that] of the backing plate, and in order to withstand a fluid pressure and an atmospheric pressure at the circulation of the cooling medium, materials, shape, and strength are determined in accordance with each case.

In the Claims

Please amend claims 1, 2, 6 and 7 of the application as follows:

1. (Amended) A backing plate which is used for a sputtering apparatus for forming a thin film on a substrate, and to which a target is bonded, the backing plate comprising:

cooling means [for ensuring a] for feeding a cooling medium to the backing plate at a predetermined flow rate, the cooling means including at least one cooling medium flow passage, wherein at least one cooling medium flow passage includes at least one branch, and

wherein there is substantially uniform temperature distribution in the target by virtue of:

(a) controlling the flow rate of the cooling medium;

(b) feeding the cooling medium to predetermined portions of the backing plate;

and

(c) [by eliminating temperature unevenness in a surface of the target caused by] applying different sputtering powers to predetermined portions of the target, and

wherein the substantially uniform temperature distribution in the target results in formation of [to obtain] a thin film having a substantially uniform film thickness.

2. (Amended) The backing plate of claim 1, wherein the [cooling means includes a cooling medium flow passage having a branch for feeding the cooling medium to a periphery of the backing plate and a flow rate of the cooling medium is controlled so as to obtain almost uniform distribution of temperature in the target] predetermined portions of the backing plate to which the cooling medium is fed include at least a periphery of the backing plate.

6. (Amended) The backing plate of claim 5, wherein an inlet [of the] for at least one cooling medium flow passage is provided at a position in the backing plate [which position corresponds] corresponding to at least one of the four corner portions of the target.

7. (Amended) A sputtering method for forming a thin film on a substrate using a target, the method comprising the steps of:

applying different sputtering powers to portions of the target [to obtain a film having a uniform film thickness]; and

cooling the target via a cooling means that includes at least one cooling medium flow passage for feeding a cooling medium to the backing plate at a predetermined flow rate, wherein at least one cooling medium flow passage includes at least one branch, and

wherein the method is effective to ensure a substantially uniform temperature distribution by eliminating temperature unevenness in a surface of the target, the uniform temperature distribution enabling formation of a thin film having a substantially uniform film thickness [caused by applying the different sputtering powers to the portions of the target].